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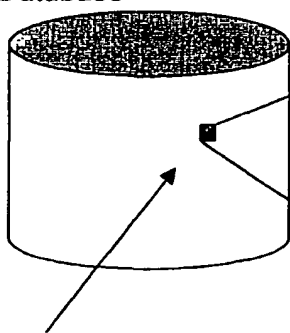
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(54) Title: MOBILE NAVIGATION

(12) Database



(11) Stored object

X - COORDINATE
Y - COORDINATE
ICON - URL (14)
INFO - URL (16)
DESCRIPTION
CATEGORY (15)

(13) Stored information

(57) Abstract: The invention relates to, at a wireless communications system, from a service server continuously update position data and data related to information objects related to an indicated geographical district. Position data and information objects are shown preferably on a map on a display unit at a mobile terminal. The information objects contain geo-codes, which indicate where on the map the object shall be shown, an icon, and a reference to supplementing information related to the navigation point. In order to limit the need of storing and transmission, the icon is not transmitted, but instead an address to a storing place in Internet, or other computer network, where the icon is accessible. The icons therefore can be anywhere in the network and can be owned by anyone. The icons can be clicked on and refer to web pages where supplementing information related to the navigation point can be derived by ordinary HTTP-protocol.

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MOBILE NAVIGATION

TECHNICAL FIELD

5

The present invention relates to, at a wireless communications system, from a service server continuously update position data and data relating to information objects related to the geographical district of current
10 interest. Position data and information objects are preferably shown on a map on a display unit at a mobile terminal.

The information objects include, in addition to geo-
15 code for the navigation points, which indicate where on the map the object shall be shown, also information about a formalised image, an icon, which shall symbolise an information object and be shown on the map. If the icon is to be derived from a computer network, address of the icon
20 is specified. The information object can also include a reference to supplementing information relating to the information point.

PRIOR ART

25

There are web-based navigation services where the user enters, for instance, two addresses into the system and gets back a table with navigation points or other
coordinates together with written instructions. The table
30 together with the instructions shows a recommended route between the indicated addresses.

In the table below, an example is shown from such a navigation service, where a recommended route from ARLANDA
35 airport to ÖSTGÖTAGATAN at Södermalm in Stockholm is shown:

At (km)	Turn	To
0,0	L	UTFART (EXIT)
0,6	R	Arlandaleden (road 273) (fairway)
4,5	V	Påfart (Intersection approach) E4 > Stockholm
5,3		E4 (Uppsalavägen) (road)
37,2		E4 (Eugeniakopplet)
38,0		E4 (Norra Länken) (link)
38,4		Avfart (Intersection exit) -> Centrum
38,9		Klarastrandsleden (fairway)
40,8		Blekhholmsfaret (subweay)
41,2	L	Centralbron (bridge)
42,7		Söderledstunneln (tunnel)
43,2		Avfart (Intersection exit > MEDBORGARPLATSEN
43,5	L	Folkungagatan (street)
43,6	R	Götgatan (street)
44,3	L	Ölandsgatan (street)
44,4	L	Östgötagatan (street)

Table 1

There also exist navigation aids in form of CDs or
 5 diskettes that can be used in, for instance, vehicles, but
 there do not exist any public mobile services that, while
 travelling, can facilitate for the user to navigate by
 means of a mobile terminal.

10 Neither do there exist any services or technologies
 that make graphical and position adapted navigation support
 for mobile clients possible via a network for mobile
 communication.

15 TECHNICAL PROBLEM

Navigation aids, which are indented to provide aid for
 an efficient selection of route, provide a considerably

better support if they can be used while travelling. Access to navigation support while travelling can be useful, for instance, if there is need to re-plan a route, or if it should turn out while travelling that another route is of
5 interest. In such situations, it is essential that the navigation support is mobile. With the navigation aids that are available today, it is necessary that the traveller breaks the journey in order to elsewhere get necessary aid for the navigation.

10

In addition to the position information, one often also need map information for planning of route. One problem then is to relate the position information to the map if the position information only is obtained in form of
15 a list.

Together with the geographical position information one may also need information about phenomena along the route, such as information about road conditions, petrol stations,
20 restaurants etc.

TECHNICAL SOLUTION

The invention describes a navigation list, a table
25 that contains instructions for navigation. The table is generated, in addition to columns with information explicitly for navigation, also columns including geo-coded information objects for each navigation instruction. The information objects include geo-codes for the navigation
30 points and a symbol, an icon. The navigation list can be used together with a device, which on client equipment shows a map, in which case the icons are shown on the map. The icons can be clicked on, and refer to web pages on Internet or other connected communication network. The
35 content of the page is derived by ordinary HTTP-protocol if Internet is utilised.

In order to limit the need for storing and transmission, the icon is not transmitted, but instead an address to a storing place or in a computer network, for instance a web address, to a place at Internet where the icon is accessible. The icons therefore can be located
5 anywhere - locally or in a computer network - and can be owned by anybody (for instance a restaurant, bank, private person or the like).

10 The transmitted information can also include an address, for instance web address, which refers to a place where information regarding the navigation points is accessible. In that way the icon can constitute a cursor for a pointer, for instance if Internet is utilised, the
15 icons can be possible to click on and refer to web pages. The content of the page is then derived by ordinary http-protocol.

The generated table is transmitted to the client,
20 which stores information and shows the navigation points/icons on the client's display unit. The information on the display unit can suitably be shown together with a map where new maps are loaded to the client as the user is moving.

25 A technical embodiment of a system that utilises the invention includes terminal/client (33), a service node (34) in capacity of a server that handles a database. The terminal includes data communication functions (possibly
30 mobile), display unit. If a map shall be shown on the display unit, and the position of current interest is shown on the map, the terminal should also be equipped with positioning system (for instance GPS). Icons (32) for the information objects are accessible on a communications
35 network, for instance Internet. Information (35) associated

to the information objects can also be derived from the same or another communications network.

5 ADVANTAGES

The information in the points can be kept up-to-date by the database only containing one pointer to the information proper, which is stored on, for instance, a web
10 page. These pointers are handled centrally by the service provider, and contain a small amount of data, so the maintenance of the pointers can be quickly performed and with high reliability, since only one party attends to the information.

15

The information pages that the pointers refer to, and which the service provider provide, can be kept up-to-date by being centrally updated. The pointer also can refer to information locations that others than the service provider
20 are responsible for. In such cases the information can be expected to be kept up-to-date by the one who provides the information; the information provider is interested in that correct information is distributed.

25 The transmission to the clients does not require large bandwidth, since a limited amount of data is transmitted initially by only pointers, for instance web addresses, being transmitted. The client then can selectively choose which information that shall be loaded. By that it will be
30 possible to utilise narrow-band, for instance mobile, communication, for instance mobile telephone, for the transmission.

A solution according to the invention is technically
35 easy to handle since:

- only standard components are required for the user equipment: Communication possibility with wire-connected telephone, or mobile telephone, such as GSM, simple computer and access to Internet, or a
5 corresponding communications network.
- the service is easy to use - load a program and the service is accessible.
- 10 • all included units communicate via an open communications network, such as Internet, by a universally accessible protocol, such as TCP/IP, which makes it easy to distribute the system.
- 15 • the utilisation of an open computer network makes it easy to rescale the system for more or fewer users, and to extend the system with different geographical districts as the market and needs are changing.
- 20 • operation, maintenance and further development of the service is facilitated by updating/upgrading and other changes only being needed to perform in one place.

LIST OF FIGURES

25

Figure 1 shows a thin database optimised for mobile information services.

Figure 2 shows how map with icons is shown to the
30 user.

Figure 3 shows a technical embodiment of a system that utilises the invention.

35

EXPLANATION OF TERMS

5	auto-active icon	Icon, which is so arranged that the client automatically derives the to the icon associated information when certain criteria are fulfilled, for instance that the client is coming within a certain distance from the object.
10	geo-code	A way to present coordinates for showing of objects on a map.
15	GPS	Global Positioning System
	GSM	Global System for Mobile Communication Cellular mobile telephone system.
20	HTTP	Hyper Text Transfer Protocol
25	Information object	Object to which is associated information that is handled in an information database. Examples of information objects: Restaurants, roadwork, navigation information, cash dispensers etc.
30	IP	Internet Protocol Protocol that is used in Internet.
	TCP	Transmission Communication Protocol

DETAILED DESCRIPTION

The description below refers to the figures of the enclosed drawings.

5

Preferred embodiment

A navigation list can be described as a table with navigation instructions, instructions for how to select
10 route at all points of selection. The list deals with how to select route alternative at different points of the route to, in the easiest way, reach the goal. The here described invention constitutes an improvement of such a navigation list by the list being supplemented with
15 information objects, i.e. objects that can be of interest to the traveller who is utilising the navigation list. Examples of navigation objects can be restaurants, roadwork, navigation information, cash dispensers, department stores, things worth seeing, and motor road
20 junctions, etc.

In said table is then generated, in addition to columns with information explicitly for the navigation, also columns with information objects. The information
25 objects include, in addition to information about their geographical coordinates, geo-codes, also a symbol, an icon, which shall be shown together with the information object. In that way navigation information and information objects can be shown at the same time on a map.

30

In order to limit the storing and transmission need, the icon that is associated with the information object is not transmitted, but instead an address to a storing place, for instance a web address to a place on Internet where the
35 icon is accessible. The icons therefore can be located anywhere, and can be owned by anybody (for instance

restaurant, cash dispenser, private person etc). In the table can also be shown an address to information related to the navigation point. If the information shall be derived via Internet, this address information is a web
 5 address where an interested party has stored information about the information object, for instance information about a restaurant, shop, or alternative route.

The information object may just as well relate to, for
 10 instance, a public authority, at which the information can apply to road conditions, or traffic alerts, or opening hours for the municipal office. Other alternatives are that private persons are given chances to provide information via information objects. If the information object also can
 15 be shown selectively to individuals, or groups, the possibility can be a vigorous aid to distribute local and time-bound information in connection with meetings and other larger or smaller arrangements.

20 The generated table, i.e. the navigation list including the geo-coded information objects, is transmitted direct to the client, which stores received data. The information then is shown on the client's display unit.

25 Below is an example of what the table that is transmitted to the client may look like.

Dist- ance	Mea- sure	Route indi- cation	Geo- code	Type of Icon	Information address
0,0	Left	EXIT	X=654.. Y=715..	ICON#2.	http://www.nav. telia.se/x654../
0,6	Right	Arlanda Route 273	X=653.. Y=714..	ICON#4	http://www.nav. telia.se/x654..

Table 2

The navigation list with the geo-coded information objects that are transmitted to the client consists of only one text string, which informs about which icon that shall be used, from where the icon shall be derived (locally from the client's internal library, or from a computer network, for instance by http from Internet), and where the icon shall be shown on the map. Since the transmitted amount of data is limited, the transmission time, also over medium with limited bandwidth, as mobile telephone, will be very short.

If auto-active icons, i.e. icons that under certain circumstances initiate the client to derive certain information, are activated, is made possible that the client's display unit automatically shows information regarding the navigation point. The information is derived by means of the address that is in the navigation list.

Database

20

In order to, at the service provider, create a navigation service according to the invention, a thin database is built, which only contains geo-code for information object, addresses for both information pages of content suppliers, and their associated icons, as well as denomination and type of category for respective information object. The icons, which are derived via a computer network, show type of category, and the physical location of content providers on the map at the client. See Figure 1, which shows the database (12), an example of a line in the navigation table (11), and the stored information (13). Table 3 shows an example of stored data for a line in the navigation table.

35

Data field	Stored data
X-coordinate	6580837
Y-coordinate	1628671
Address to icon	http://www.sterikssjukhus.se/sjukhus_icon.jpg
Address to information about information object	http://www.sterikssjukhus.se/S:t_Erik_index.html
Describing text	S:t Eriks Sjukhus (hospital)
Category	Sjukhus (hospital)

Table 3

The figure shows an example of an information object of the category "Hospital" (Sjukhus) (S:t Eriks sjukhus/S:t Eric's Hospital). The x- and y-coordinates indicate the physical position of the information object, i.e. the geographical position of the hospital. The address to the icon of the information object and the information page are specified by web addresses.

10

The information database in this way will be easy to handle, because the amount of data per information object is very small, since the major part of the information is derived by the client from the content provider's server by means of the stored address.

15

By the content provider, who often is information owner of the shown information, managing the vital (delicate) information himself/herself, the security issues will have a simple management. No secret information need

20

to be handled by a service provider, and the information owner himself/herself attends to the correctness.

The information database is thin, i.e. it only holds
5 geo-code for information objects and belonging addresses to content providers. This means that data that are transmitted to the client will take up small space, i.e. it will adapt the information to networks with small bandwidth, such as mobile telephone networks, in an optimal
10 way.

The information database will be cheap and easy to establish and operate. Universally accessible programs for databases can be utilised to operate the database.
15

The database always contains current and up-to-date information by being updated centrally, having small data fields (references) and by that being fast, having possibility to be made optionally reliable because only one
20 party attends to the maintenance of it, and by containing addresses that are seldom updated.

The information can be kept up-to-date by the database only containing pointer to the information proper, which is
25 stored so that it can be accessed via computer networks.

Showing on map

30 The information the client has requested for a certain district is geographically coded. The client utilises this to, on the map, place icons that represent different objects (hotels, hospitals etc) in the district. The icons as such are not transmitted to the clients, but only a
35 pointer (addresses) to geo-coded information objects in a computer network, for instance Internet, where the client

can derive the icons. The icons are after that derived from the network by the client. By this procedure, the client only needs to handle the coordinates and an address.

- 5 If the information is derived via Internet, the pointer is a web address and the icon can be derived by the http-protocol.

10 The geo-coded pointer also holds an indication that indicates which category of object the icon shall represent (hotel, restaurant etc). If the client experiences that it takes too long time to derive the icon from the network, a standard icon is used, which can be stored locally in the client, for the category in question.

15

20 The information, which is based on the data of the navigation list, should best be shown on a map on the client's display unit, at which position in question (22), navigation points and the icons (21) of the navigation objects, appear on the map as the user is moving. See Figure 2. In this way the user will have a graphical navigation aid, which, if it is utilised with mobile communication, can be used during the whole car drive. It is also possible for the user to get further information
25 about the information objects via the associated address information that is included in the navigation list.

30 The user's position is shown by an indication on the map. By means of, for instance, form or colour of the indication, the user very easily can decide the degree of reliability of the position information. On the map is also indicated in the list indicated icons. Associated with these icons there also is the address of the information that is available to be derived via computer network. At
35 utilisation of Internet, the user can click on the icon, at which the associated web address is utilised to, by means

of the HTTP-protocol, derive the stored information. The stored information is automatically shown when the user is approaching the place of the geo-code of the icon.

5

The user's perspective

The user starts the client program in his/her terminal, at which a map over the local surrounding is loaded to the client. On the map is shown the user's position and geo-coded information objects that are placed on the map as icons. These can be clicked on, for showing information objects to which the icon refers, and/or these information objects are shown automatically, depending on how far from these virtual objects the user is. Examples of information objects can be restaurants, roadwork, navigation information, cash dispensers etc.

Client application

20

The user is equipped with a terminal (client computer, for instance an ordinary, portable computer), which should best be equipped with functionality for positioning (for instance GPS) and access to Internet, for instance via telephone, preferably mobile telephone, for instance GSM.

The user can manage parts of his/her personal profile directly via the client application, which then is transmitted and stored in the service logic. The advantage of this, instead of storing the profile locally, is that the user can use any mobile terminal with the client program installed and yet have access to his/her personal profile.

35

ALTERNATIVE EMBODIMENTS

Computer networks and positioning

5 The different parts in the user environment are exchangeable. The user's equipment and utilised programs and systems are adapted to the environment and infrastructure that is utilised. At that can, for instance, other computer networks than Internet be utilised and
10 several different ways to handle the user's position are possible, such as other positioning systems, or manual position registration.

Adaptation

15 The invention describes a method with great flexibility by icons and positioning following the real route that the user is moving along. It is possible to, in advance, plan a journey and get the information shown by
20 manually entering position and movements.

 Further, the route is shown and to the route related information during the travel proper, and by that the real route will be shown on the display unit, and if it diverges
25 from planned route, specific information can be provided.

 At possibility of selection between alternative routes, the method can include guiding for selection of route.

30

Navigation at sea

 The navigation aid can also be utilised at other navigation than at travelling by car. A support at
35 navigation at sea can guide a seafarer through the best navigable channel. If the navigation aid utilises

supplementing information such as draught, height of mast, point of time for opening of bridges, and passing through locks, as well as weather conditions, a good support can be obtained for an efficient selection of route.

5

The navigation aid can also be used as an automatic pilot.

SCENARIOS

10

A firm of haulage contractors may have an assignment to deliver goods to different places to which it can be difficult to find the route even with good knowledge of the district. It can be worth a lot to, in a simple way, show the customer's address and enclose a description of the route in form of a navigation list. For the firm of haulage contractors the object is to deliver the goods quickly, and then it is important to have access to an up-to-date description of the route.

20

If the navigation aid is kept well updated, also road and traffic conditions can constitute a good support for transports also in districts where the driver has good knowledge of the road network.

25

Since the map image can be updated continuously, it is possible that police and the public authority that is responsible for the road also utilises this means to distribute acute information about traffic and road conditions, closed roads or other conditions that influence accessibility and risks. This can be of special value at heavy transports in districts where the road conditions can be different, for instance in connection with the thawing of the frozen soil.

35

Traffic supervising organisations can distribute information about existing traffic and in that way provide a support that makes the traffic better running. The navigation aid then will be a considerably better medium
5 than the traffic information that today is provided by radio.

10 The invention is not limited to above shown embodiments but can, in addition, be subject to modifications within the frame of the following patent claims and the idea of invention.

PATENT CLAIMS

1. A navigation aid, which, on a display unit at a client
equipment (33) that communicates with a service server
5 (35) via a wireless communications system (37),
specifies and continuously updates a recommended route
between two or more geographically indicated points,
c h a r a c t e r i s e d in, together with said
specification of a recommended route, appointing
10 information objects in connection with the recommended
route and related to the geographical district in
question, and to, together with said appointing of
information object, provide a first pointer device to
one in connection with a communications network, for
15 instance Internet (31), arranged storing place for
further information (35) related to said information
objects where said further information is accessible
by means of procedures applicable in said
communications network.
20
2. A navigation aid as claimed in patent claim 1,
c h a r a c t e r i s e d in that appointing of said
information objects is made by an icon (21), which is
shown on the client's display unit.
25
3. A navigation aid as claimed in patent claim 2,
c h a r a c t e r i s e d in that said service server
has access to a database (34) with necessary
geographical data to indicate a recommended route, and
30 that in said database is stored, for each information
object, said first pointer device and a second pointer
device, to one in connection with a communications
network, for instance Internet (31), arranged storing
place for said icon (32), which symbolises the
35 information object.

4. A navigation aid as claimed in patent claim 3,
c h a r a c t e r i s e d in that said second pointer
device contains data (15) that indicate which category
the icon shall represent.
- 5
5. A navigation aid as claimed in patent claim 3 or 4,
c h a r a c t e r i s e d in that said first (16) and
second pointer device (14) consist of addresses to
storing places in connection with said communications
10 network.
6. A navigation aid as claimed in any of patent claims 2
to 5, c h a r a c t e r i s e d in that the navigation
aid is utilised together with an arrangement that
15 shows a map (20) on the client's display unit, and
that said recommended route and said icons (21) are
shown on said map.
7. A navigation aid as claimed in any of the patent
20 claims 2 to 6, c h a r a c t e r i s e d in that
deriving of said further information related to said
information object is initiated:
- by the user indicating said icon, for instance by
25 clicking by means of pointer connected to the
client equipment or,
 - if the information object is connected with an
auto-active icon, automatically by the navigation
30 aid when certain conditions are fulfilled, for
instance that the client's position is within a
certain distance from the geographical position
to which the information object is related.
- 35 8. A navigation aid as claimed in any of the previous
patent claims, c h a r a c t e r i s e d in that

said further information related to information objects are provided for access by said communications network by content provider, which is independent from service provider, that provides said service server,
5 and that said content provider can be a private person, public authority, company, or other organisation.

9. A navigation aid as claimed in any of the previous
10 patent claims, c h a r a c t e r i s e d in that a navigation list is transmitted from service server to client by said communication between client and service server, and that said navigation list consists of only one text string, which indicates which icon
15 that shall be used, from where the icon shall be derived, and where the icon shall be shown on the map.
10. A navigation aid as claimed in any of the previous patent claims, c h a r a c t e r i s e d in that
20 communication between client, service server and storing places is executed over Internet by means of TCP/IP-protocol, and that the client utilises mobile telephone to establish contact with Internet.
- 25 11. A navigation aid as claimed in any of the previous patent claims, c h a r a c t e r i s e d in utilising of supplementing information about:
 - features, for instance height, weight, draught or
30 maximum speed, related to certain means of transport,
 - authority, preferred point of time for departure and other features related to certain driver, and
35 /or

- features, for instance maximum speed, maximum allowed height, maximum allowed draught, or times when passing is allowed or prohibited, related to said route.

5

12. A navigation aid as claimed in any of the previous patent claims, c h a r a c t e r i s e d in that said appointing of recommended route takes into consideration traffic information, for instance
10 information about queuing, accidents, or wildlife alert.

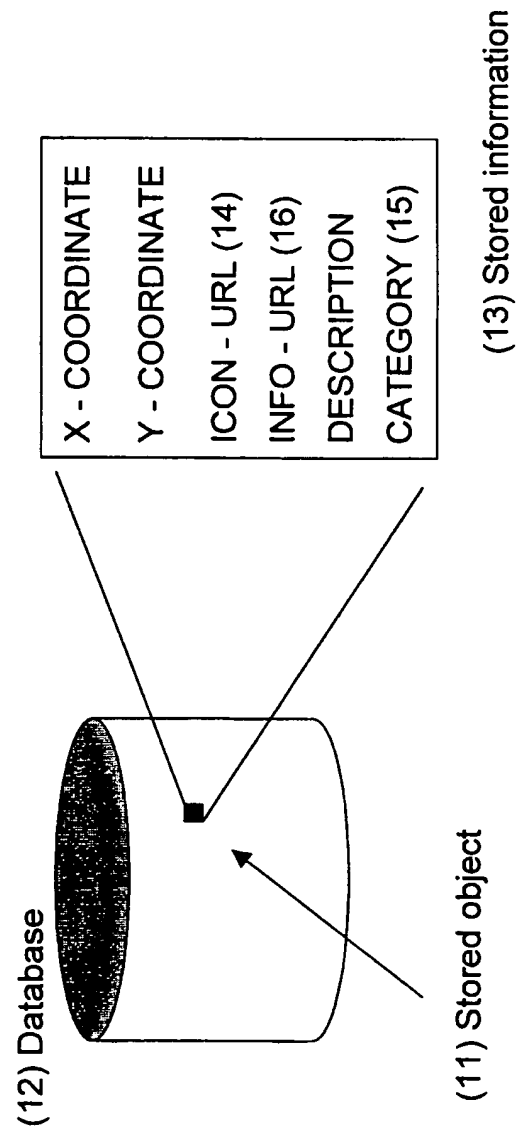


Figure 1

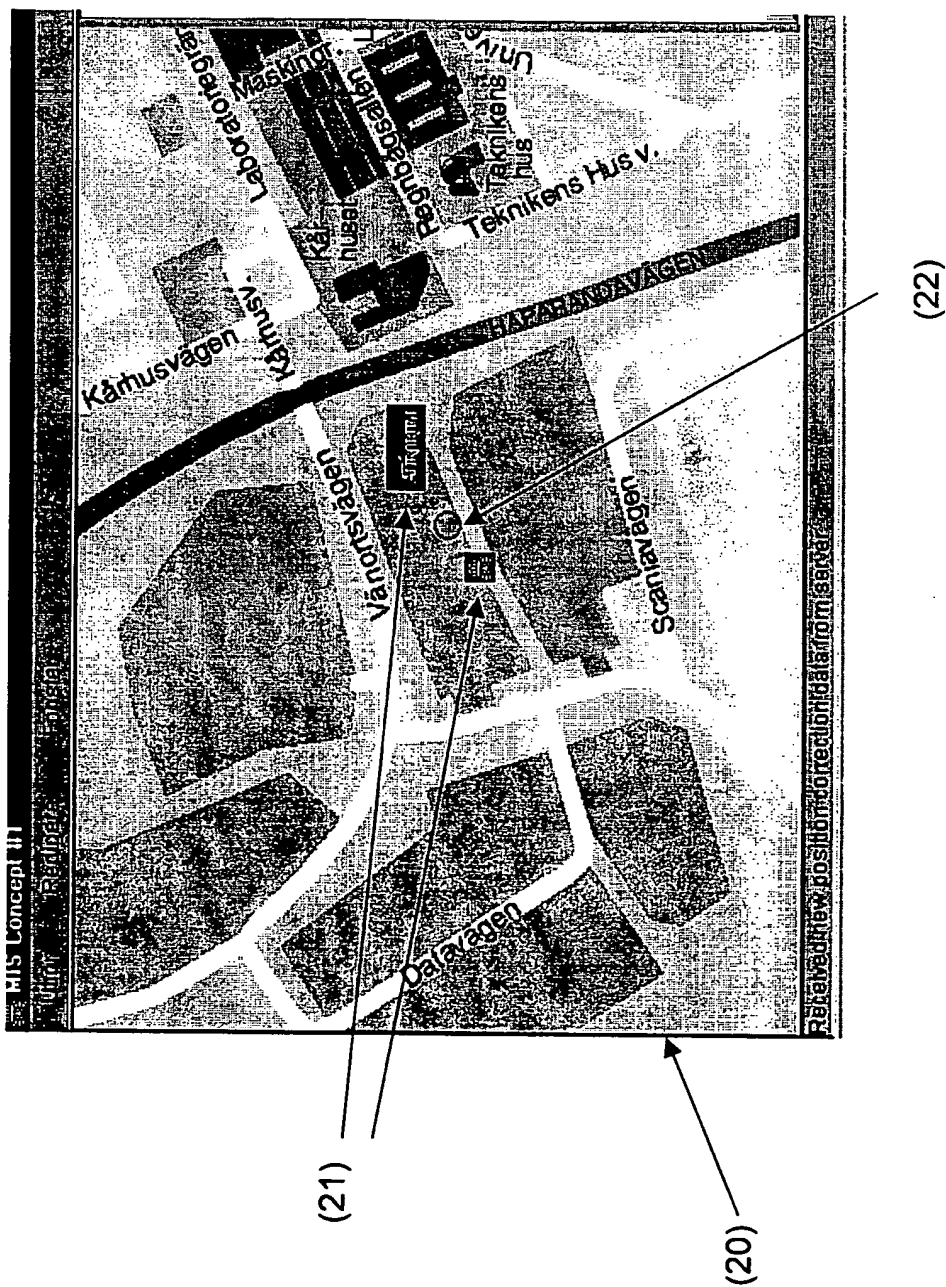


Figure 2

3/3

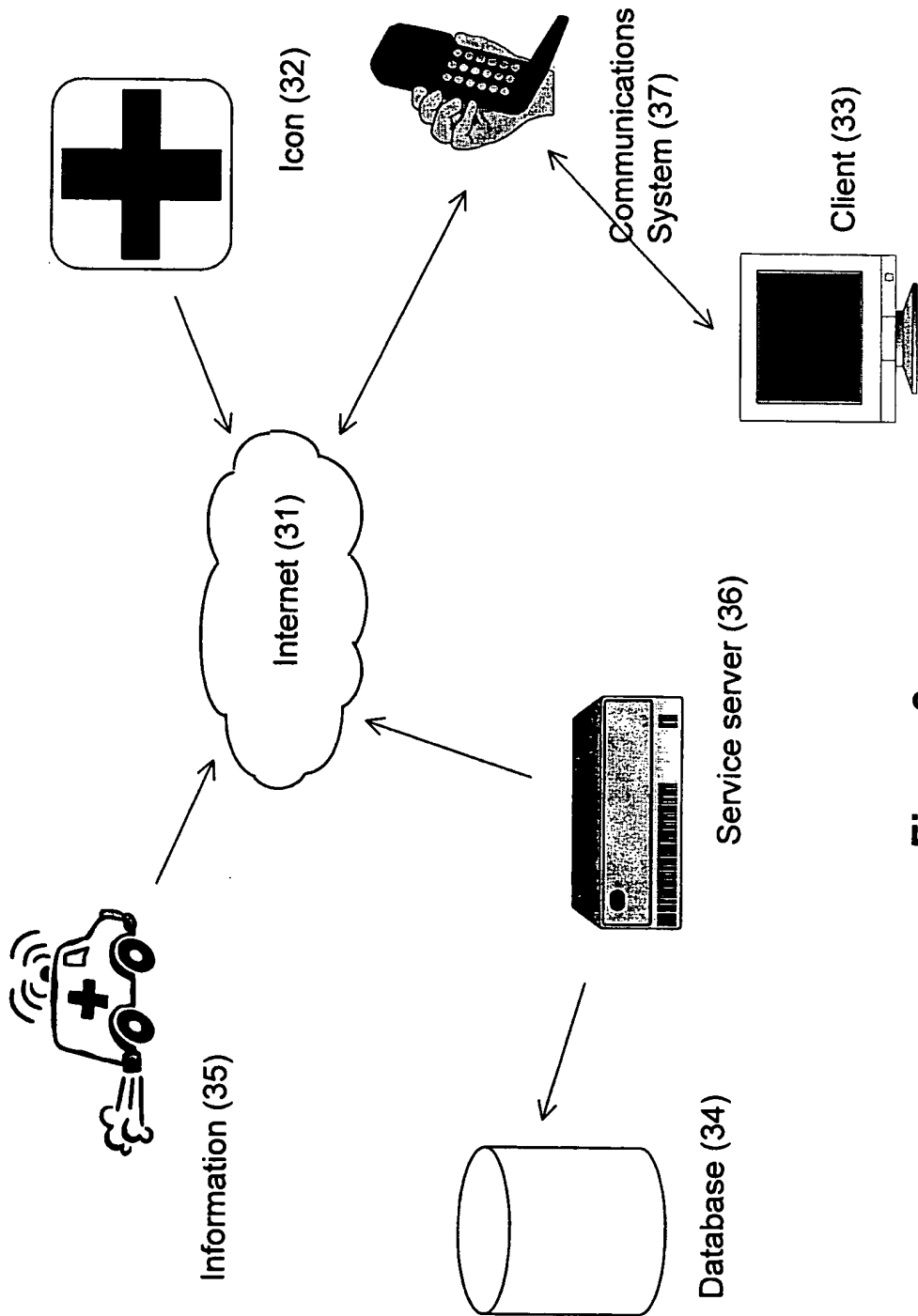


Figure 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/01339

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G01C 21/20, G08G 1/0969

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G01C, G06F, G08G, H04M, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0829704 A2 (HITACHI, LTD.), 18 March 1998 (18.03.98), column 2, line 3 - line 9; column 4, line 14 - line 40; column 11, line 48 - column 12, line 13, figures 1-3,14,15 --	1,2,6-12
X	WO 9707467 A1 (PHELAN, SEAN), 27 February 1997 (27.02.97), page 1, line 23 - page 2, line 6; page 2, line 35 - page 3, line 8; page 5, line 14 - page 6, line 16, figures 2,3 --	1,2,6-12
A	IEICE TRANS. COMMUN., Volume E80-B, No 10, October 1997, Nobutsugu, Fujino et al, "Mobile Information Service Based on Multi-Agent Architecture" page 1401 - page 1406 --	1-12

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

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